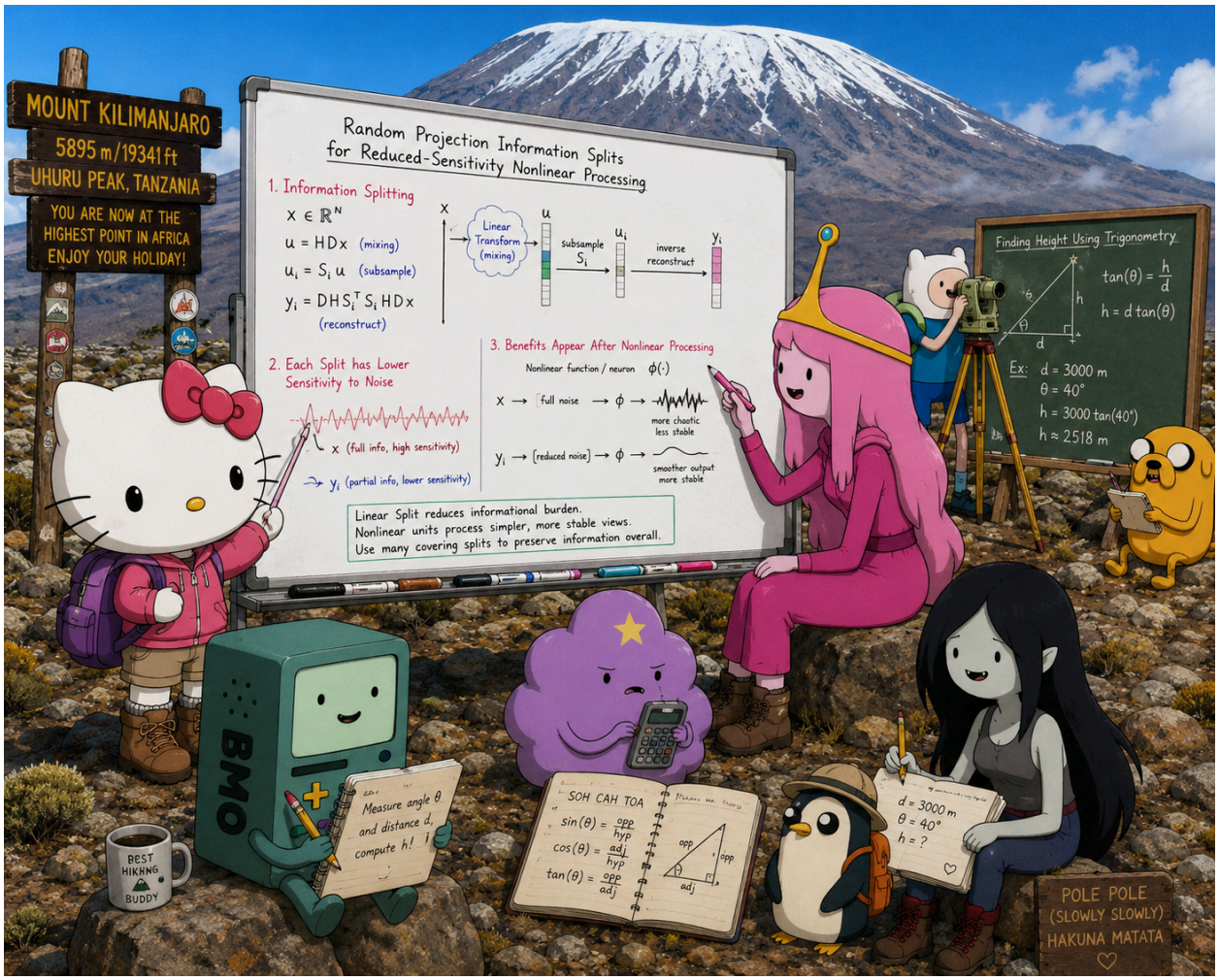
MOUNT KILIMANJARO
5895 m / 19341 ft
UHURU PEAK, TANZANIA
YOU ARE NOW AT THE HIGHEST POINT IN AFRICA
ENJOY YOUR HOLIDAY!
Random Projection Information Splits for Reduced-Sensitivity Nonlinear Processing
1. Information Splitting
$x \in \mathbb{R}^N$
$u = HDx$ (mixing)
$u_i = S_i u$ (subsample)
$y_i = DHS_i^T S_i HDx$ (reconstruct)
Linear Transform (mixing)
subsample S_i
inverse reconstruct
2. Each Split has Lower Sensitivity to Noise
x (full info, high sensitivity)
y_i (partial info, lower sensitivity)
3. Benefits Appear After Nonlinear Processing
Nonlinear function / neuron $\phi(\cdot)$
full noise
more chaotic less stable
[reduced noise]
smoother output more stable
Linear Split reduces informational burden.
Nonlinear units process simpler, more stable views.
Use many covering splits to preserve information overall.
Finding Height Using Trigonometry
$\tan(\theta) = \frac{h}{d}$
$h = d \tan(\theta)$
Ex: d = 3000 m
θ = 40°
h = 3000 tan(40°)
h ≈ 2518 m
BMO
Measure angle θ and distance d, compute h!
SOH CAH TOA
$\sin(\theta) = \frac{opp}{hyp}$
$\cos(\theta) = \frac{adj}{hyp}$
$\tan(\theta) = \frac{opp}{adj}$
d = 3000 m
θ = 40°
h = ?
BEST HIKING BUDDY
POLE POLE (SLOWLY SLOWLY)
HAKUNA MATATA

Random projection with restore sub-sampling for neural networks. Using the random projection inverse so you don’t have to deal with scrambled geometry.
You can use a ‘foreign’ inverse if you do want to scramble the information, say for associative memory.